processes are introduced in a way to show that they are necessary for the solution of practical problems. The lists of problems and applications contain many practical problems, and may be read with profit by American textbook writers.

The treatment of variation and of geometric progression is especially good. There is a good discussion of limiting values, followed by convergency and divergency of series. In some London University examinations a knowledge of French and German mathematical terms is required, hence a few problems in those languages are given. Why should not our college textbooks contain some problems in these languages? Forty-seven pages are given to examination papers of the universities of Oxford, Cambridge, and London, of the joint matriculation boards of universities, and so on; and it is interesting to note that nearly every paper contains one problem on the graph.

Plane and Solid Geometry. By ELMER A. LYMAN. New York: American Book Co., 1908. Pp. 340. $1.25.

It was the purpose of the author "to prepare a geometry through which a student must work his way, relying on his reasoning powers rather than on his memory." The logical side has been emphasized throughout, and though there is no great departure from the beaten path, the changes made are along the lines upon which there has been general agreement in the recent discussions on the teaching of geometry.

The desire of many teachers to postpone or omit the discussion of incommensurable number and limits has received some consideration. However, the author or teacher who wishes to lighten the burden of the pupils at this point, should make it clear to them that this is done by omitting exact definitions and rigorous proofs. The definition, "A limit of a variable is a constant that the variable may approach and remain indefinitely near," is certainly not the best that could be given; and here as elsewhere it is left for the teacher to assure the pupils that the reasoning is not rigorous.

Historical notes are a welcome addition to any textbook, and those given here are well selected. They should be used by the teacher to arouse the interest of the pupils in the development of geometry. There is a good number of geometrical and numerical exercises. While some hints are given concerning accuracy and rapidity in computation, the subject deserves greater attention. There is a wide field for problems including principles of arithmetic, algebra, and geometry in which short methods of computation may be practiced, methods of checking results may be learned, and the limits of accuracy may be determined.

It would seem that the ideal textbook in geometry should include much drawing and construction, should demand that measurements be made by the pupils, and should keep alive the algebra of the preceding year.

A Scrap-Book of Elementary Mathematics. By WILLIAM F. WHITE. Chicago: The Open Court Publishing Co., 1908. Pp. 248. $1.00.

This volume includes seventy essays, puzzles, and notes on interesting and curious mathematical problems. It is just what the name denotes, a scrap-book

of elementary mathematics, but like many a scrap-book it contains much valuable material. The teacher who reads this book carefully will have at hand a fact from the history of mathematics, an interesting little puzzle, a fallacy, or a pertinent illustration to drive home a truth or to break the monotony of some particularly dull moments of a recitation period. Moreover, this book is an admirable introduction to the whole subject of mathematical recreations and to the history of mathematics. It shows many of the interesting things that can be found in such books as: Ball, *Mathematical Recreations and Essays;* Ahrens, *Mathematische Unterhaltungen und Spiele;* Schubert, *Mathematische Mussestunden;* Lucas; *Récréations mathématiques;* Ball, *A Short History of Mathematics;* Cajori, *History of Elementary Mathematics.*

A few of the titles will serve to indicate the nature of the book: Multiplication at sight—a new trick with an old principle. A few numerical curiosities. Numbers arising from measurement. Present trends in arithmetic. Napier's rods, and other mechanical aids to calculations. The three parallel postulates. The three famous puzzles of antiquity. The circle-squarer's paradox. Quotations of mathematics. Magic squares. Axioms in elementary algebra. Do the axioms apply to equations? Checking the solution of an equation. Algebraic fallacies.

The last four notes are of especial value in the first-year algebra classes, since many authors of elementary algebras give little heed to the equivalency of equations. In fact, in some elementary textbooks widely used equations are given which have no solution; nevertheless, the pupils obtain an alleged solution and find their results are correct on referring to the answer book.

This book and others of like content should be in every high-school library. The author well says that amusement is one of the fields of applied mathematics. Here the interest of many pupils may be awakened, and as a result their required work in mathematics may become more pleasurable, hence more profitable.

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Electricity, Sound and Light. A Short University Course. By R. A. MILLIKAN AND JOHN MILLS. Boston: Ginn & Co., 1908. Pp. 389. Illustrated. $2.00.

This book is an attempt to secure a satisfactory articulation of the laboratory and classroom phases of instruction, and to present a complete logical development, from the standpoint of theory as well as experiment, of the subjects indicated in the title. It is designed to occupy a half-year of daily work, two hours per day, in either the freshman, sophomore, or junior year of the college or technical-school course.

It is divided into short, one-subject chapters, giving the necessary explanations and deriving the general principles involved. At the end of each chapter is an experiment or two typical of the subject of the chapter, followed by illustrative examples of the experiments. At the end of the book there are sets of questions applicable to each chapter; and these are followed by tables giving